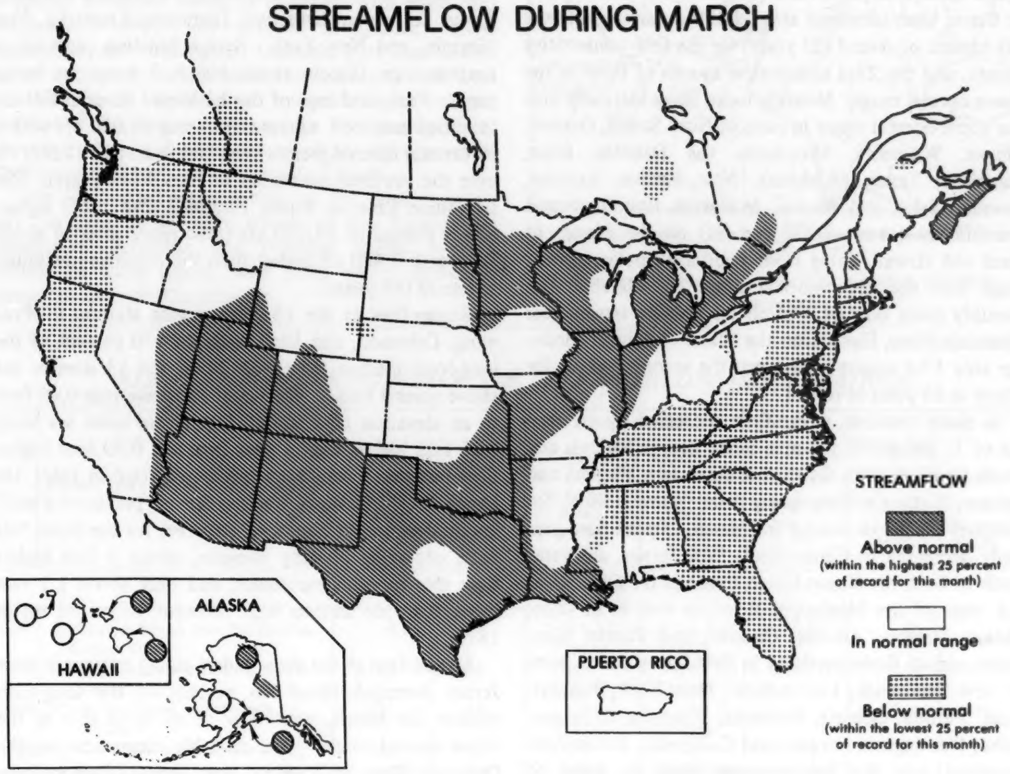
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

MARCH 1985

STREAMFLOW DURING MARCH



Streamflow was in the normal range or above that range at 65 percent of the index stations in the United States and Southern Canada. Below-normal flows persisted in New Jersey and in parts of New Brunswick, Connecticut, New York, Pennsylvania, Florida, Georgia, Nebraska, Wyoming, Montana, Idaho, Washington, Oregon, and California. Streamflow decreased by an average of 71 percent at the nine index sites in Virginia and North Carolina, with flows in southeastern Virginia and eastern North Carolina going from above-normal for February to below-normal for March. In sharp contrast, flows increased by about 2,000 percent on the Hawaiian Islands of Maui and Hawaii, going from February's below-normal range into the above-normal range for March.

Usable contents of both the New York City reservoir system and the combined contents of the five reporting reservoir sites in Washington were well below the long-term March average but 77 percent of the reporting reservoirs were close to or above their long-term March averages.

Flooding in northwestern Illinois washed away about 50 houses and damaged about 1200 houses while peak discharges on the La Moine River at both Colmar and Ripley exceeded those for the 70-year recurrence interval.

STREAMFLOW CONDITIONS DURING MARCH 1985

Streamflow generally increased seasonally in a band from southern Quebec to New York and extending westward through the Great Lakes States to the Continental Divide, and also in Saskatchewan, Wyoming, Colorado, New Mexico, Arizona, and Nevada. Monthly mean flows remained in the above-normal range in parts of Ontario, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Arkansas, Louisiana, Mississippi, Nebraska, Oklahoma, Texas, New Mexico, Arizona, Utah, Idaho, Wyoming, and Colorado. The monthly mean flow of 8,150 cubic feet per second (cfs) on the Colorado River at Cisco, Utah (drainage area 24,100 square miles), was the highest of record (73 years) for the fifth consecutive month, and the 23rd consecutive month of flows in the above-normal range. Monthly mean flows increased into the above-normal range in parts of Nova Scotia, Quebec, Illinois, Wisconsin, Minnesota, the Dakotas, Iowa, Louisiana, Texas, Oklahoma, New Mexico, Arizona, Nevada, Idaho, and Alaska. In Hawaii, flows increased dramatically (about 2,000 percent) on the islands of Maui and Hawaii, going from February's below-normal range into the above-normal range for March. The monthly mean flow of 37.5 cfs on Waiakea stream near Mountain View, Hawaii, on the island of Hawaii (drainage area 17.4 square miles), was the second highest for March in 55 years of record.

In sharp contrast, streamflow decreased by an average of 71 percent at the nine index sites in Virginia and North Carolina, with flows in southeastern Virginia and eastern North Carolina going from above-normal for February to below-normal for March. Streamflow generally decreased in Connecticut, New Jersey, all States south of both the Mason-Dixon Line and the Ohio River and west of the Mississippi River, as well as in Ohio, Kansas, Oregon, Alberta, Ontario, and Puerto Rico. Below-normal flows persisted in New Jersey and in parts of New Brunswick, Connecticut, New York, Pennsylvania, Florida, Georgia, Nebraska, Wyoming, Montana, Idaho, Washington, Oregon, and California. Streamflow decreased into the below-normal range in parts of Alberta, Montana, Oregon, California, Ontario, Quebec, Massachusetts, Connecticut, Pennsylvania, Ohio, West Virginia, Georgia, Florida, Tennessee, Mississippi, Alabama, and all of Kentucky, Virginia, and the Carolinas. The monthly mean flow of 1,340 cfs on the French Broad River at Asheville, North Carolina (drainage area 945 square miles), was the lowest for March in 90 years of record.

Flood stages, as designated by the National Weather Service, were exceeded on many rivers and small streams during March in the Great Lakes States, South Dakota, Nebraska, Iowa, Kansas, Missouri, Oklahoma, Arkansas, Texas, Louisiana, Mississippi, Tennessee, Kentucky, West Virginia, and New York. Severe flooding occurred in northwestern Illinois about March 5 (map on facing page). Peak discharge of the La Moine River at Colmar (drainage area 655 square miles) was 39,000 cfs with a recurrence interval greater than 100 years and 12,000 cfs over the previous maximum of record (41 years). The La Moine River at Ripley (drainage area 1,293 square miles) peaked at 24,100 cfs (recurrence interval about 70 years), 2,400 cfs higher then the previous maximum of record (65 years).

Streamflow at the 13 index gaging stations in Wyoming, Colorado, and Utah averaged 170 percent of the long-term median flow with 11 of the 13 sites in the above-normal range. The Great Salt Lake rose 0.40 foot to an elevation of 4,209.55 feet above mean sea level, 2.20 feet higher than a year ago, and 0.30 foot higher than last year's maximum, which occurred in July. On March 11, the National Weather Service predicted a maximum elevation of about 4,210.5 feet for the Great Salt Lake occurring in early summer, about 1 foot higher than this month's maximum, and only about 1.1 feet lower than the all-time high elevation of record set in 1873.

Streamflow at the three index gaging stations in New Jersey averaged about 46 percent of the long-term median for March, with flow at all three sites in the below-normal range. The monthly mean flow on the Delaware River at Trenton, New Jersey (drainage area 6,780 square miles), was 9,670 cfs, only 48 percent of

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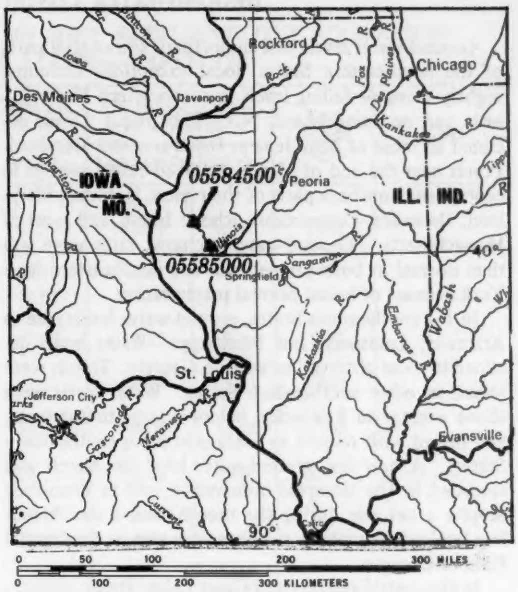
the long-term median and the fifth consecutive month of flows in the below-normal range at that site. The contents of the New York City reservoir system, much of it in the Delaware River basin, were at 59 percent of normal maximum, compared to 89 percent of normal maximum last March, and a long-term average for March of 96 percent.

The combined flow of the three largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia rivers—was 1,703,910 cfs during March, 67 percent higher than last month, and 44 percent above the long-term average.

Contents of most selected reservoirs (85 percent) generally remained stable or increased with significant declines occurring only at sites in Quebec, New Hampshire, and Washington. Contents were significantly below average at only 23 percent of reporting sites, with the New York City reservoir system being at only 62 percent of the long-term average for March and the five reporting sites in Washington at about 45 percent of their combined long-term average for March.

The four hydrographs shown on this page highlight two streams on opposite slopes of the Appalachian Mountains (Allegheny and Potomac rivers), a small stream on Long Island, New York, and a Tennessee stream in an undeveloped area.



Location of stream-gaging stations in Illinois, discussed on page 2.

Provisional data; subject to revision

NEW EXTREMES DURING MARCH 1985 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Years of record	Previous March extremes (period of record): Monthly mean in cfs (year)	Previous March extremes (period of record): Daily mean in cfs (year)	March 1985: Monthly mean in cfs	March 1985: Percent of median	March 1985: Daily mean in cfs	March 1985: Day
	LOW FLOWS								
01188000	Burlington Brook near Burlington, Connecticut.	4.13	54	6.55 (1981)	1.60 (1980)	6.47	40	3.10	31
01193500	Salmon River near East Hampton, Connecticut.	102	57	185 (1981)	55 (1980)	158	42	92	31
02256500	Fisheating Creek at Palmdale, Florida.	311	54	0 (1956)	0 (1935)	0	0	0	(*)
03451500	French Broad River at Asheville, North Carolina.	945	90	1,273 (1898)	740 (1898)	1,340	48	1,120	21
03540500	Emory River at Oakdale, Tennessee.	764	58	1,106 (1932)	222 (1968)	974	31	601	21
03574500	Paint Rock River near Woodville, Alabama.	320	50	576 (1954)	137 (1968)	450	33	203	21
	HIGH FLOWS								
08378500	Pecos River near Pecos, New Mexico.	189	67	70.3 (1932)	151 (1963)	83.6	276	143	12
09180500	Colorado River near Cisco, Utah . .	24,100	74	6,872 (1916)	16,100 (1916)	8,150	240	9,560	13
09299500	Whiterocks River near Whiterocks, Utah.	113	78	58.9 (1910)	80 (1910)	59.4	228	.....	...
09430500	Gila River near Gila, New Mexico.	1,864	58	971 (1949)	8,000 (1978)	1,062	694	2,300	14
09448500	Gila River at Head of Safford Valley, near Solomon, Arizona.	7,896	71	3,295 (1978)	17,400 (1978)	3,630	1,152	7,230	13

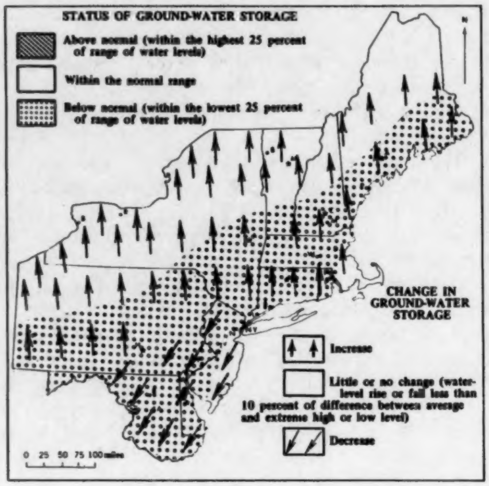
*Occurred more than once.

GROUND-WATER CONDITIONS DURING MARCH 1984

Ground-water levels rose in northern and central parts of the northeastern States, local exceptions including slightly rising or falling levels in southeastern Massachusetts and on Long Island, N.Y. (See map.) Levels declined in most of New Jersey, Delaware, and Maryland. Levels near the end of March remained below average in central and southern parts of the region, including Maryland, Delaware, Connecticut, Rhode Island, and most of Massachusetts. Ground-water recharge rates were less than normal in both Connecticut and southeastern New York because of below-normal precipitation.

In the southeastern States, ground-water levels rose in Arkansas, Louisiana, and Mississippi. Water levels declined in most observation wells in Georgia. Trends were mixed in other southeastern States. Water levels were above average in Kentucky, below average in Arkansas, and mixed with respect to average in other southeastern States. A new low ground-water level for March was recorded in the Memphis observation well in Tennessee despite a net rise during the month, and a new March low level was reached in the Savannah area in the Coastal Plain of Georgia.

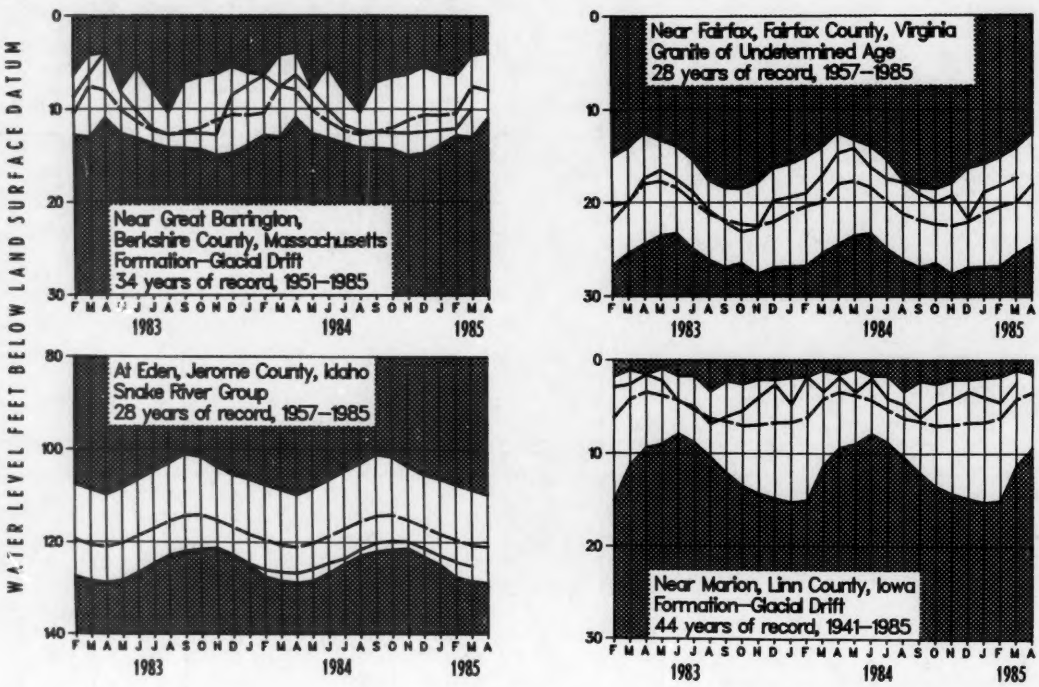
In the central and western Great Lakes States, ground-water levels rose in Wisconsin and Indiana, and mostly



Map shows ground-water storage near end of March and change in ground-water storage from end of February to end of March.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.



Provisional data; subject to revision

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES—MARCH 1985

Aquifer and location	Water level in feet with reference to land-surface datum	Departure from average in feet	Net change in water level in feet since: Last month	Last year	Year records began	Remarks
Glacial drift at Hanska, south-central Minnesota	–5.28	+1.79	+1.38	+0.92	1942	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan	–3.84	+0.70	+0.53	–0.30	1935	
Glacial drift at Marion, Iowa	–2.18	+1.87	+2.34	+1.17	1941	
Glacial drift at Princeton in northwestern Illinois	–5.80	+3.84	+3.22	+0.34	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia	–15.77	–1.51	–0.29	–4.22	1939	
Glacial outwash sand and gravel, Louisville, Kentucky (U.S. well no. 2)	–16.53	+9.05	+0.09	+1.36	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	–103.66	–15.31	+0.41	+0.85	1941	March low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina (U.S. well no. 5)	–39.94	+2.14	+0.29	–3.14	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	–224.80	–19.29	+4.40	+2.45	1958	
Eutaw Formation in the City of Montgomery, Alabama (U.S. well no. 4)	–17.5	+0.7	–2.8	–2.7	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia (U.S. well no. 6)	–32.65	+7.55	–0.26	+1.84	1956	March low.
Sand and gravel in Puget Trough, Tacoma, Washington	–99.28	+8.33	+0.40	+0.20	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	–458.6	+3.0	–1.7	–1.8	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	–124.8	–3.7	–0.6	+1.7	1957	
Alluvial valley fill in Flowell area, Millard County, Utah (U.S. well no. 9)	*+0.9	+26.0	–0.3	+19.1	1929	
Alluvial sand and gravel, Platte River Valley, Ashland, Nebraska (U.S. well no. 6)	–4.30	+0.30	+0.48	–2.12	1935	
Alluvial valley fill in Steptoe Valley, Nevada	–7.62	+5.09	+0.35	+1.46	1950	Alltime high.
Pleistocene terrace deposits in Kansas River valley, at Lawrence, northeastern Kansas	–18.67	+2.56	+1.80	+2.59	1953	
Alluvium and Paso Robles clay, sand, and gravel, Santa Maria Valley, California	–100.75	+40.12	–4.17	–1.75	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	–105.5	–27.3	+0.3	+2.4	1951	
Hueco bolson, El Paso area, Texas	–261.61	–16.26	+0.07	+0.18	1965	
Evangeline aquifer, Houston area, Texas	–304.48	–9.76	+2.77	+2.71	1965	

*Estimated.

rose in Minnesota and Iowa. Trends were mixed in Michigan and Ohio. Water levels were above average in Michigan, and mostly above average in Wisconsin and Iowa; levels were mixed with respect to average in Minnesota. No new extremes were observed.

In the western States, ground-water levels rose in Washington, North Dakota, and Texas. Levels also rose in Kansas, except for one key well in which the level showed no net change during the month. Levels declined in southern California. Trends were mixed in other western States. Water levels were mixed with respect to average in all the reporting western States except in Arizona where the levels in the two key wells were below average. Despite a net decline during the month, the level in the key well at Logan, Utah, equalled the new March high set in 1984. Two new high levels for March also were recorded, one in Idaho and another in New Mexico. New low March ground-water levels were recorded in Kansas, Arizona, and New Mexico. A new alltime high level in 34 years of record was reached in the Steptoe Valley observation well in Nevada.

Provisional data; subject to revision

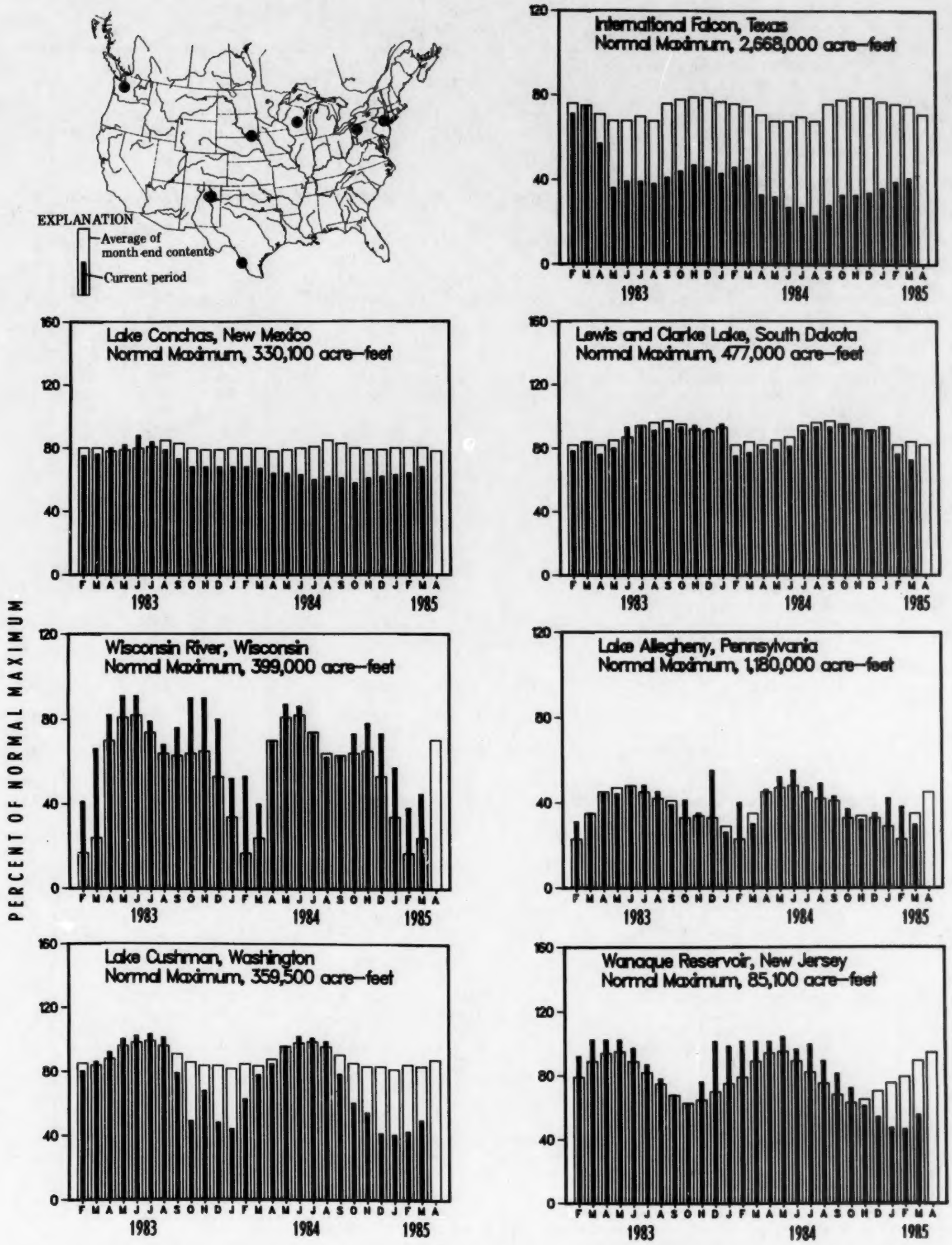
USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF MARCH 1985

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	Percent of normal maximum: End of Mar. 1985	End of Mar. 1984	Average for end of Mar.	End of Feb. 1985	Normal maximum (acre-feet)[a]
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	38	72	64	22	[b]226,300
QUEBEC					
Allard (P)	24	29	32	33	280,600
Gouin (P)	63	58	47	67	6,954,000
MAINE					
Seven reservoir systems (MP)	31	44	36	26	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	26	30	16	31	76,450
Lake Francis (FPR)	37	26	22	41	99,310
Lake Winnipesaukee (PR)	67	88	65	56	165,700
VERMONT					
Harriman (P)	51	46	34	54	116,200
Somerset (P)	63	36	52	67	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	64	82	78	60	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	47	43	48	37	786,700
Indian Lake (FMP)	62	51	48	63	103,300
New York City reservoir system (MW)	59	89	...	50	1,680,000
NEW JERSEY					
Wanaque (M)	55	101	89	46	85,100
PENNSYLVANIA					
Allegheny (FPR)	31	30	35	38	1,180,000
Pymatuning (FMR)	95	94	94	90	188,000
Raystown Lake (FR)	68	68	56	68	761,900
Lake Wallenpaupack (PR)	63	61	64	39	157,800
MARYLAND					
Baltimore municipal system (M)	95	102	92	96	261,900
NORTH CAROLINA					
Bridgewater (Lake James) (P)	86	89	90	91	288,800
Narrows (Badin Lake) (P)	90	100	100	94	128,900
High Rock Lake (P)	49	73	83	49	234,800
SOUTH CAROLINA					
Lake Murray (P)	86	90	79	87	1,614,000
Lakes Marion and Moultrie (P)	81	93	81	76	1,862,000
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	71	81	74	71	1,730,000
GEORGIA					
Burton (PR)	72	88	84	69	104,000
Sinclair (MPR)	88	98	89	89	214,000
Lake Sidney Lanier (FMPR)	62	65	61	62	1,686,000
ALABAMA					
Lake Martin (P)	85	87	89	77	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	47	58	52	45	2,229,300
Douglas Lake (FPR)	23	38	43	24	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	55	66	64	50	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	51	55	56	50	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	58	64	63	52	1,478,000
WISCONSIN					
Chippewa and Flambeau (PR)	58	50	27	53	365,000
Wisconsin River (21 reservoirs) (PR)	45	40	25	38	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	21	18	19	16	1,640,000
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	82	84	82	81	22,700,000
SOUTH DAKOTA					
Angostura (I)	80	95	82	73	127,600
Belle Fourche (I)	84	74	63	69	185,200
Lake Francis Case (FIP)	77	73	81	69	4,834,000
Lake Oahe (FIP)	89	90	...	86	22,530,000
Lake Sharpe (FIP)	91	100	100	100	1,725,000
Lewis and Clarke Lake (FIP)	72	77	84	76	477,000
NEBRASKA					
Lake McConaughy (IP)	81	81	77	81	1,948,000
OKLAHOMA					
Eufaula (FPR)	113	106	87	124	2,378,000
Keystone (FPR)	107	81	100	161	661,000
Tenkiller Ferry (FPR)	115	112	93	89	628,200
Lake Altus (FIMR)	18	46	54	10	133,000
Lake O'The Cherokees (FPR)	100	111	87	130	1,492,000
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	107	94	89	105	2,722,000
TEXAS					
Bridgeport (IMW)	72	72	47	66	386,400
Canyon (FMR)	89	88	78	88	385,600
International Amistad (FIMPW)	66	76	84	67	3,497,000
International Falcon (FIMPW)	43	47	74	39	2,668,000
Livingston (IMW)	104	102	88	100	1,788,000
Possum Kingdom (IMPRW)	97	82	94	94	570,200
Red Bluff (PI)	32	14	29	32	307,000
Toledo Bend (P)	92	93	87	92	4,472,000
Twin Buttes (FIM)	12	22	32	12	177,800
Lake Kemp (IMW)	86	103	85	77	268,000
Lake Meredith (FWM)	34	40	37	34	796,900
Lake Travis (FIMPRW)	99	79	81	93	1,144,000
MONTANA					
Canyon Ferry (FIMPR)	68	77	75	67	2,043,000
Fort Peck (FPR)	83	85	82	82	18,910,000
Hungry Horse (FIPR)	52	60	59	58	3,451,000
WASHINGTON					
Ross (PR)	8	50	30	29	1,052,000
Franklin D. Roosevelt Lake (IP)	19	89	50	53	5,022,000
Lake Chelan (PR)	20	42	31	23	676,100
Lake Cushman (PR)	50	78	84	43	359,500
Lake Merwin (P)	103	92	97	103	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	64	62	66	56	1,235,000
Coeur d'Alene Lake (P)	48	93	72	13	238,500
Pend Oreille Lake (FP)	37	61	51	37	1,561,000
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	69	79	75	67	4,401,000
WYOMING					
Boysen (FIP)	70	73	64	72	802,000
Buffalo Bill (IP)	65	71	60	68	421,300
Keyhole (F)	43	34	46	41	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	74	71	51	75	3,056,000
COLORADO					
John Martin (FIR)	94	38	19	90	364,400
Taylor Park (IR)	59	46	55	65	106,200
Colorado–Big Thompson project (I)	73	83	55	84	730,300
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	83	82	...	84	31,620,000
UTAH--IDAHO					
Bear Lake (IPR)	74	74	60	75	1,421,000
CALIFORNIA					
Folsom (FIP)	70	77	62	64	1,000,000
Hetch Hetchy (MP)	27	73	28	33	360,400
Isabella (FIR)	40	48	30	42	568,100
Pine Flat (FI)	58	74	58	62	1,001,000
Clair Engle Lake (Lewiston) (P)	77	84	83	77	2,438,000
Lake Almanor (P)	70	96	55	75	1,036,000
Lake Berryessa (FIMW)	90	100	90	89	1,600,000
Millerton Lake (FI)	71	81	66	60	503,200
Shasta Lake (FIPR)	78	94	84	74	4,377,000
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	73	68	55	71	744,600
NEVADA					
Rye Patch (I)	96	36	67	67	194,300
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	91	91	68	92	27,970,000
ARIZONA					
San Carlos (IP)	104	82	28	102	935,100
Salt and Verde River system (IMPR)	97	84	52	95	2,019,100
NEW MEXICO					
Conchas (FIR)	67	67	79	64	330,100
Elephant Butte and Caballo (FIPR)	73	56	31	71	2,453,000

[a] 1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, FEBRUARY 1983 TO MARCH 1985



FLOW OF LARGE RIVERS DURING MARCH 1985

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	March 1985					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	3,140	129	+182	5,600	3,620	31
01318500	Hudson River at Hadley, N.Y	1,664	2,909	3,860	129	+100	7,800	5,040	31
01357500	Mohawk River at Cohoes, N.Y	3,456	5,734	9,780	92	+95	11,000	7,100	31
01463500	Delaware River at Trenton, N.J	6,780	11,750	9,672	48	+43	5,940	3,839	31
01570500	Susquehanna River at Harrisburg, Pa	24,100	34,530	48,100	67	+60	52,200	33,740	28
01646500	Potomac River near Washington, D.C.	11,560	[1]11,490	13,600	56	–36	20,000	13,000	31
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	3,225	32	–77	2,270	1,467	31
02131000	Pee Dee River at Peedee, S.C	8,830	9,851	6,137	34	–66	6,110	3,948	27
02226000	Altamaha River at Doctortown, Ga	13,600	13,880	10,690	34	–48	7,900	5,110	28
02320500	Suwannee River at Branford, Fla	7,880	6,987	3,880	35	+1	4,230	2,733	31
02358000	Apalachicola River at Chattahoochee, Fla	17,200	22,570	21,700	53	–27	18,800	12,150	31
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	23,300	17,760	37	–73	12,200	7,890	28
02489500	Pearl River near Bogalusa, La	6,630	9,768	18,180	104	–33	7,590	4,905	31
03049500	Allegheny River at Natrona, Pa	11,410	[1]19,480	49,100	121	+94	35,100	22,690	25
03085000	Monongahela River at Braddock, Pa.	7,337	[1]12,510	21,840	103	–2	22,400	14,480	25
03193000	Kanawha River at Kanawha Falls, W. Va	8,367	12,590	15,140	63	–37	17,100	11,050	26
03234500	Scioto River at Higby, Ohio	5,131	4,547	8,128	84	+14	2,690	1,738	29
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	209,500	85	+9	106,400	68,770	24
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	107,000	186	+213	68,300	44,140	31
03469000	French Broad River below Douglas Dam, Tenn	4,543	6,798	4,444	38	–64	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,163	4,461	105	–8	3,409	2,203	23
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	276,710	111	+8	280,000	181,000	31
02NG001	St. Maurice River at Grand Mere, Quebec	16,300	25,150	7,470	89	+136	18,300	11,830	27
05082500	Red River of the North at Grand Forks, N. Dak	30,100	2,551	6,045	324	+357	12,500	8,080	28
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	8,250	85	–5	8,700	5,620	22
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	13,638	429	+1,039	30,200	19,520	19
05331000	Mississippi River at St. Paul, Minn	36,800	[1]10,610	30,264	392	+379	60,700	39,230	22
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	9,133	195	+257	27,458	17,746	29
05407000	Wisconsin River at Muscoda, Wis	10,300	8,617	15,891	166	+72	18,850	12,183	29
05446500	Rock River near Joslin, Ill	9,551	5,873	21,100	228	+161	13,000	8,400	31
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	152,800	182	+119	137,600	88,930	31
06214500	Yellowstone River at Billings, Mont	11,796	7,038	3,367	109	+12	3,420	2,210	27
06934500	Missouri River at Hermann, Mo	524,200	79,490	167,800	226	+36	125,000	80,800	28
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	1,330,600	163	+94	1,303,000	842,000	31
07331000	Washita River near Dickson, Okla.	7,202	1,368	5,962	1,005	+38	5,990	3,871	26
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	725	935	164	+51	860	555	31
09315000	Green River at Green River, Utah.	40,600	6,298	8,210	203	+45	.....	.....	...
11425500	Sacramento River at Verona, Calif	21,257	18,820	11,303	36	–25	9,500	6,140	28
13269000	Snake River at Weiser, Idaho	69,200	18,050	22,530	114	–1	24,900	16,090	27
13317000	Salmon River at White Bird, Idaho	13,550	11,250	5,150	102	+21	5,540	3,580	28
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	8,480	66	+124	7,020	4,537	28
14105700	Columbia River at The Dalles, Oreg[1,5]	237,000	193,100	96,600	79	+27	159,700	103,220	27
14191000	Willamette River at Salem, Oreg.	7,280	23,510	19,700	61	–28	29,000	18,700	27
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	6,771	110	+9	7,400	4,780	31
08MF005	Fraser River at Hope, British Columbia	83,800	96,290	28,250	88	+15	29,600	19,100	29

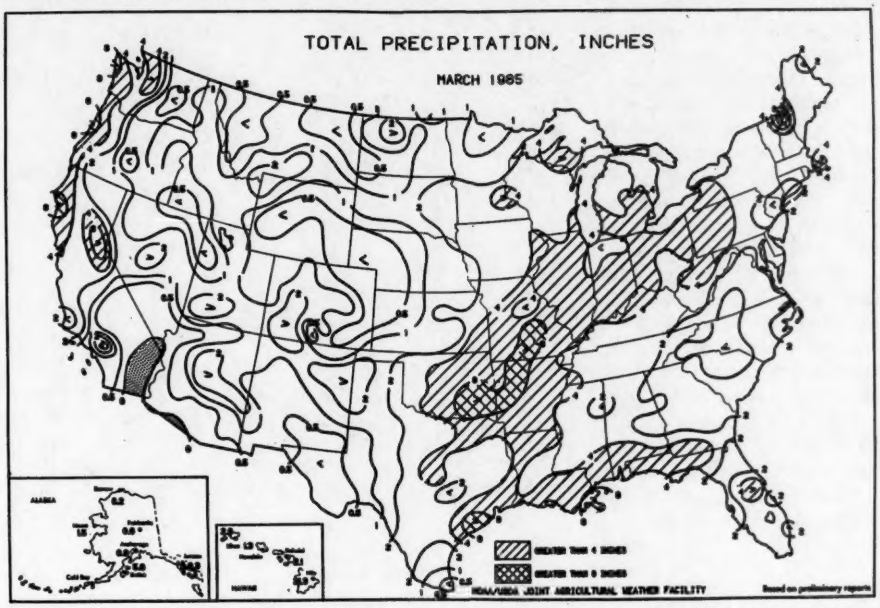
[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES, MARCH 1984, AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	March data of following calendar years	Stream discharge during month: Mean (cfs)	Dissolved-solids concentration[a]: Minimum (mg/L)	Dissolved-solids concentration[a]: Maximum (mg/L)	Dissolved-solids discharge[a]: Mean (tons per day)	Dissolved-solids discharge[a]: Minimum (tons per day)	Dissolved-solids discharge[a]: Maximum (tons per day)	Water temperature[b]: Mean, in °C	Water temperature[b]: Minimum, in °C	Water temperature[b]: Maximum, in °C
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1985	9,670	76	101	2,280	1,560	5,070	7.0	3.5	13.0
		1945–84	20,400	44	136	.....	1,100	98,100	...	0	15.0
		(Extreme yr)		(1945)	(1980)		(1980)	(1978)			
			[c]20,040								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. (median streamflow at Ogdensburg, N.Y.)	1985	277,000	165	167	124,000	117,000	129,000	1.0	1.0	1.0
		1976-84	269,500	164	170	120,800	94,000	145,000	1.0	0	3.0
		(Extreme yr)		(1977)	(1979)		(1977)	(1978)			
			[c]250,000								
07289000	Mississippi River at Vicksburg, Miss.	1985	1,331,000	190	234	734,000	621,000	800,000	10.5	8.5	13.5
		1976–84	868,800	166	254	476,000	180,000	803,000	9.0	5.0	14.5
		(Extreme yr)		(1979)	(1980)		(1981)	(1979)			
			[c]814,500								
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (streamflow station at Metropolis, Ill.)	1985	473,000	154	189	.....	195,000	285,000	...	4.5	8.5
		1955–84	545,500	128	312	.....	54,000	776,000	...	0.5	14.5
		(Extreme yr)		(1955, 1964)	(1968)		(1968)	(1979)			
			[c]578,300								
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1985	167,800	232	339	129,000	98,000	175,000	9.0	3.0	15.0
		1976-84	109,900	186	530	89,300	29,300	199,000	7.5	0	13.0
		(Extreme yr)		(1978)	(1981)		(1977)	(1979, 1984)			
			[c]74,200								
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1985	175,000	107	111	51,600	41,000	65,800	5.0	3.5	6.0
		1976-84	205,700	87	126	58,900	25,600	114,300	6.5	3.0	8.0
		(Extreme yr)		(1980)	(1979)		(1980)	(1983)			
			[c]122,950								

[a]Dissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.



(From Weekly Weather and Crop Bulletin published by National Weather Service and Department of Agriculture.)

A WATER-QUALITY STUDY OF THE TIDAL POTOMAC RIVER AND ESTUARY—AN OVERVIEW

The abstract and illustrations below are from the report, *A water-quality study of the tidal Potomac River and Estuary—an overview*, edited by Edward Callender, Virginia Carter, D. C. Hahl, Kerie Hitt, and Barbara I. Schultz, U.S. Geological Survey Water-Supply Paper 2233, 46 pages, 1984. This report may be purchased for $2.75 from Eastern Distribution Branch, Text Products Section, U.S. Geological Survey, 604 S. Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

The U.S. Geological Survey began a 5-year interdisciplinary study of the tidal Potomac River and Estuary in October of 1977. (See figure 1.) The objectives of the study are: (1) to provide a basic understanding of physical, chemical, and biological processes; (2) to develop flow and transport models to predict the movement and fate of nutrients and algae; and (3) to develop efficient techniques for the study of tidal rivers and estuaries. The ultimate goal is to aid water-quality decisionmaking for the tidal Potomac River and Estuary.

The study is being conducted by scientists from many disciplines involved in 14 interrelated studies. These scientists are addressing five major problem areas: nutrient enrichment, algal blooms, dissolved oxygen, sedimentation, and effects of water quality on living resources. Preliminary results show that treatment of sewage has reduced the concentration load of organic carbon and phosphorus below that of the 1960's and 1970's, and changed the form of dissolved nitrogen in the tidal river. (See figure 2.) Concentrations of chlorophyll *a* during the study period were lower than those experienced during the massive algal blooms of the 1960's. Dissolved oxygen concentrations fluctuate in response to changes in algal populations, but remain above the Environmental Protection Agency limits during the summer low-flow period. Sedimentation rates have accelerated during the past 50–70 years due to urbanization and farming. Asian clams have recently invaded the tidal river; submersed aquatic vegetation has declined since the early 1900's, but conditions may now favor its return.

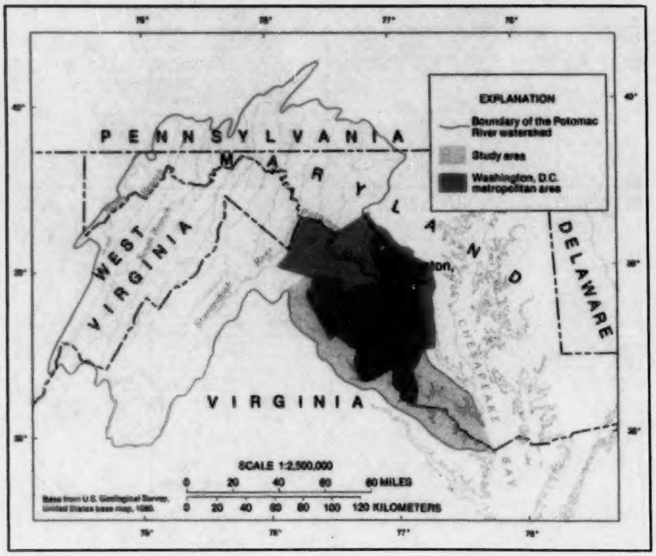
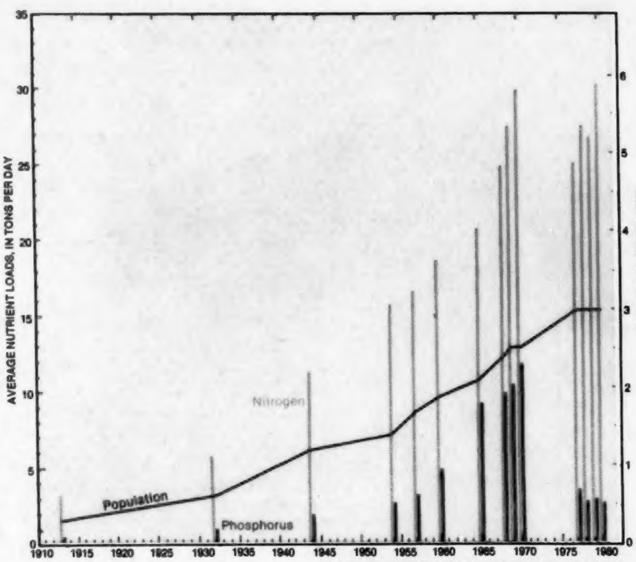


Figure 1.—Potomac River drainage basin showing study area in the Washington, D.C., metropolitan area.

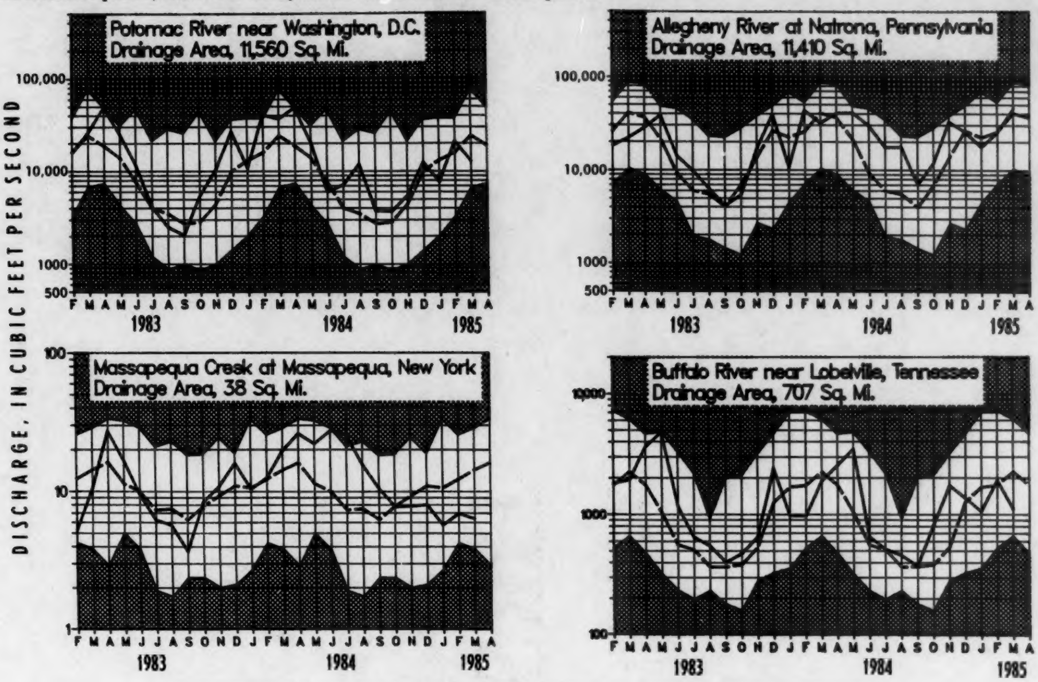


Nutrient loading data for 1913-70 from Champ, Villa, and Bubeck, 1981; 1977 from Clark and Roesch, 1978; 1978 from Clark, Roesch, and Bray, 1980; 1979-80 from Wayne E. Webb, written communication, 1982.

Figure 2.—Nitrogen and phosphorus loadings from sewage, and population growth, in the Washington, D.C., metropolitan area, 1913–80.

SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.



NATIONAL WATER CONDITIONS

March 1984

Based on reports from the Canadian and U.S. Field offices; completed April 12, 1985

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile). Shorter reference periods are used for the Puerto Rico index stations because of the limited records available.

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. Probability of occurrence is the chance that a given flood magnitude will be exceeded in any one year. Recurrence interval is the reciprocal of probability of occurrence and is the *average* number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. Recurrence intervals imply no regularity of occurrence; a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels*, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for March are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

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